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HEATING VALUES OF NATURAL GASES OF THE MIDCONTINENTAL FIELD.

By H. C. ALLEN.

WHILE a number of new gas pools hove been opened up in the midcontinental field in the last few years, no particular work of a chemical nature has been done on any of these gases since the work of Cady and McFarland.[1] Results of a preliminary examination of a number of these new gases are given in the following, together with some analyses of gases from the older pools of the field.

The thing of practical importance to the ordinary consumer of natural gas is its heating power, and these gases are of great interest in this line from the fact that they vary over such a wide range. This is illustrated in the following table:

TABLE I.

No.	LOCATION. (Sec., twp., range.)	CO_2.	HHC.	O_2.	CH_4.	C_2H_6.	Res.	B.t.u.
1*	Augusta, Kan. (500 feet)	0.13	0.00	0.00	10.54	1.64	87.69	129
2	Cowley county, Kan. (24-33-6)	0.13	0.00	0.37	16.27	3.01	80.23	209
3	Chautauqua county, Kan. (35-33-10)	0.30	0.00	0.18	42.38	1.85	55.29	441
4	Chautauqua county, Kan. (25-33-10)	0.00	0.00	0.40	49.01	3.89	46.67	541
5*	Ellsworth, Kan	0.30	0.23	0.09	61.09	1.09	37.20	609
6*	Ponca City, Okla. (4-25-2E)	0.05	0.00	0.40	44.60	14.86	40.10	688
7	Kay county, Okla.	0.21	0.32	0.00	57.91	9.89	31.65	735
8*	Chautauqua county, Kan. (15-34-13)	0.55	0.00	0.81	85.53	0.15	12.95	839
9*	Chautauqua county, Kan. (15-34-13)	0.11	0.59	0.98	79.13	7.79	11.39	894
10	Butler county, Kan. (2-28-4)	0.00	0.71	0.14	62.15	18.38	18.64	930
11	Montgomery county, Kan.	0.24	0.24	0.25	83.04	8.54	7.95	970
12	Blackwell, Okla. (13-28-1W)	0.00	1.18	0.16	70.69	18.65	9.32	1025
13	Cushing, Okla. (28-18-7)	tr.	0.12	tr.	70.74	21.64	7.49	1059
14	Bartlesville, Okla. (12-26-14)	0.24	1.21	0.24	70.50	24.60	3.21	1125

All B.t.u. above are calculated to 0° C. and 760 mm. pressure from the following values: Heavy hydrocarbons (HHC), 1627; CH_4, 966; C_2H_6, 1728.

* Analyzed by Mr. E. E. Lyder. No. 8 from 530 feet of sand; No. 9 from 580 feet of sand.

1. University of Kansas Geol. Survey, vol. 9.

So far as the writer is aware, such a wide variation in composition and heating value is not found in the other natural-gas fields, and it has been a rather common practice to consider natural gases, with a few unimportant exceptions, to be of about the same composition and heating value.

The economic problem involved in the sale of these gases is a very material one, since some of these gases of low heating value are found in considerable quantities and the lower ones are practically valueless as fuels. While no effort is being made to sell the gas from the shallow Augusta or Dexter fields, gases of all the other grades listed above are being sold. The loss to the consumer in heat units, and consequently in money, from the use of a 500 B. t. u. gas amounts to 50 per cent when compared to the present gas supplied to Lawrence as a standard.

The following are typical analyses of gas from wells located in various parts of the midcontinental field:

TABLE II. *Oklahoma.*

LOCATION. (Sec., twp., range.)	No. of samples.	CO_2.	HHC.	O_2.	CH_4.	C_2H_6.	Res.	B.t.u.
Pawhuska, (3-25-9)	3	0.77	0.15	0.62	90.9	5.4	2.4	971
Cushing, (28-18-7)	5	tr.	0.12	tr.	70.74	21.64	7.49	1059
Cushing, (6-18-7)	2	0.83	0.42	0.42	67.26	18.96	12.14	984
Bigheart, (Lot 298)	3	0.86	0.15	0.30	78.90	16.43	3.34	1048
Hominy creek, (11-22-10)	2	0.16	0.46	1.07	79.09	11.47	7.76	970
Hominy, (9-23-8)	2	tr.	0.00	tr.	75.65	8.69	15.52	881
Bartlesville, (12-26-14)	7	0.13	1.03	0.39	72.02	21.16	5.29	1078
Hogshooter, (30-26-15)	5	0.14	0.83	0.10	73.07	20.63	5.23	1075
Hogshooter, (33-26-14)	2	1.55	0.00	0.39	91.82	2.35	3.98	927
North Osage, (2-28-10)	8	0.40	0.80	0.54	72.64	13.62	11.88	950
Wann, (34-28-14)	4	0.48	0.49	0.32	76.66	16.26	5.80	1029
Wagner county, (6-19-15)	1	1.60	1.53	0.36	69.01	17.31	10.17	991
Blackwell, (24-28-1W)	14	0.00	0.32	0.47	71.40	20.13	7.76	1043
Blackwell,* (16-29-1E)	1	0.05	0.10	0.11	60.54	6.22	32.97	690
Ponca,* (9-27-3E)	5	1.00	0.23	0.00	84.16	7.53	7.08	947
Ponca,* (4-25-2E)	1	0.05	0.00	0.40	44.60	14.86	40.10	688

* Analyses by Mr. E. E. Lyder.

TABLE III. *Kansas.*

LOCATION. (Sec., twp., range.)	No. of samples.	CO_2.	HHC.	O_2.	CH_4.	C_2H_6.	Res.	B.t.u.
Augusta, (*a*)	10	.....	.....	.....	.....	.....	.....	.....
Sedan, (*b*)	13	.....	.....	.....	.....	.....	.....	.....
Sedan, (*c*)	6	.....	.....	.....	.....	.....	.....	.....
Arkansas City,* (15-35-2)	2	0.00	0.38	0.10	67.36	14.68	17.46	908
Arkansas City,* (18-34-4)	1	0.00	0.43	0.00	73.28	17.10	9.18	1006
Allen county, (9-26-20)	1	0.35	1.15	0.39	79.80	4.33	14.00	865
Winfield,* (12-33-4)	5	0.36	0.00	0.24	77.90	9.51	11.98	912
Havana	2	0.00	0.45	0.20	72.56	13.46	13.34	955
Benedict, (16-28-15)	1	0.12	0.00	0.46	92.30	.....	4.30	900

* Analyses by Mr. E. E. Lyder.
(*a*) See Table I, No. 1, for 1400 feet of gas. (*b*) See Table I, No. 4. (*c*) See Table I, No. 3.

TABLE IV. *City Supplies.*

CITY.	Date.	CO_2.	HHC.	O_2.	CH_4.	C_2H_6.	Res.	B.t.u.
Lawrence, Kan.	Aug. 19, 1913	0.00	0.23	0.35	88.18	4.90	6.12	941
Lawrence, Kan.	Jan. 9, 1914	0.62	0.62	0.17	82.38	9.92	6.22	977
Lawrence, Kan.	Feb. 23, 1914	0.72	0.57	tr.	86.42	7.23	5.06	969
Lawrence, Kan.	Nov. 24, 1914	1.28	1.55	0.93	79.00	7.28	10.00	913
Lawrence, Kan.	Jan. 15, 1915	0.71	0.24	0.08	85.77	7.97	5.25	970
Lawrence, Kan.*	Mar. 14, 1915	0.79	0.13	0.35	81.75	11.14	5.82	979
Lawrence, Kan.*	Apr. 15, 1915	0.13	0.54	0.29	88.30	6.82	3.82	975
Udall, Kan.	Dec. 18, 1913	0.27	0.37	0.44	63.00	5.67	30.35	713
Udall, Kan.	Feb. 18, 1914	0.00	0.00	0.38	73.39	17.73	8.51	1015
Wellington, Kan.	Dec. 18, 1913	0.20	0.12	0.36	65.18	10.20	23.96	808
Wellington, Kan.	Feb. 18, 1914	0.00	0.60	0.31	75.53	15.42	8.15	1005
Winfield, Kan.	Feb. 18, 1914	0.00	0.47	0.63	73.82	16.87	8.21	1013
Burden, Kan.	Feb. 18, 1914	0.93	0.00	0.31	79.26	10.33	9.17	944
Augusta, Kan.	Feb. 21, 1914	0.00	1.01	tr.	75.68	10.97	12.33	956
Ottawa, Kan.	Feb. 21, 1915	0.40	0.53	0.54	88.93	4.68	4.93	948
Wichita, Kan.	Dec. 18, 1913	0.27	0.76	0.22	59.88	15.69	23.13	862
Wichita, Kan.	Feb. 10, 1914	0.36	0.72	0.24	64.71	17.66	16.28	942
Hutchinson, Kan.	Feb. 10, 1914	0.46	0.70	0.23	66.20	17.24	15.17	949
Arkansas City, Kan.	Dec. 18, 1913	0.16	0.17	0.20	52.06	33.42	15.10	1066
El Dorado, Kan.	Dec. 8, 1913	0.53	0.00	0.59	45.70	30.81	22.49	974
Fort Worth, Tex.	Jan. 25, 1914	0.00	0.63	tr.	46.40	13.96	39.01	700
Dallas, Tex.	Jan. 24, 1914	0.00	0.51	0.25	40.92	17.96	40.37	714

*Analyses by Mr. E. E. Lyder.

The above work is preliminary, in a way, to a general survey of the midcontinental field that is being made by the University of Kansas, and which is to be published later.